



SEQUENCE LISTING

(1) GENERAL INFORMATION:

(i) APPLICANT: Choulika, Andre  
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(ii) TITLE OF INVENTION: Nucleotide Sequence Encoding the Enzyme I-SCEI and the Uses Thereof

(iii) NUMBER OF SEQUENCES: 52

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(v) COMPUTER READABLE FORM:

(A) MEDIUM TYPE: Floppy disk  
(B) COMPUTER: IBM PC compatible  
(C) OPERATING SYSTEM: PC-DOS/MS-DOS  
(D) SOFTWARE: PatentIn Release #1.0, Version #1.25

(vi) CURRENT APPLICATION DATA:

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(vii) PRIOR APPLICATION DATA:

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(vii) PRIOR APPLICATION DATA:

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(B) FILING DATE: 05-NOV-1992

(vii) PRIOR APPLICATION DATA:

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(B) FILING DATE: 05-MAY-1992

(viii) ATTORNEY/AGENT INFORMATION:

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(C) REFERENCE/DOCKET NUMBER: 3495-0111-10

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(2) INFORMATION FOR SEQ ID NO:1:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 714 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:1:

ATGCATATGA AAAACATCAA AAAAAACCAG GTAATGAACC TCGGTCCGAA CTCTAACTG	60
CTGAAAGAAC ATCAAATCCC GCTGATCGAA CTGAACATCG AACAGTTCGA AGCAGGTATC	120
GGTCTGATCC TGGGTGATGC TTACATCCGT TCTCGTGATG AAGGTAAAAC CTACTGTATG	180
CAGTCGAGT GGAAAAACAA AGCATACATG GACCACGTAT GTCTGCTGTA CGATCAGTGG	240
GTACTGTCCC CGCCGCACAA AAAAGAACGT GTTAACCACC TGGGTAACCT GGTAAATCACC	300
TGGGGCGCCC AGACTTTCAA ACACCAAGCT TTCAACAAAC TGGCTAACCT GTTCATCGTT	360
AACAACAAAA AAACCATCCC GAACAACCTG GTTGAAAAC ACTTGACCCC GATGTCTCTG	420
GCATACTGGT TCATGGATGA TGGTGGTAAA TGGGATTACA ACAAAAACTC TACCAACAAA	480
TCGATCGTAC TGAACACCCA GTCTTCACT TTCGAAGAAG TAGAATAACCT GGTTAAGGGT	540
CTGCGTAACA AATTCCAAC GAACTGTTAC GTAAAAATCA ACAAAAACAA ACCGATCATC	600
TACATCGATT CTATGTCTTA CCTGATCTTC TACAACCTGA TCAAACCGTA CCTGATCCCG	660
CAGATGATGT ACAAAACTGCC GAACACTATC TCCTCCGAAA CTTTCCTGAA ATAA	714

(2) INFORMATION FOR SEQ ID NO:2:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 237 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:2:

Met His Met Lys Asn Ile Lys Lys Asn Gln Val Met Asn Leu Gly Pro			
1	5	10	15

Asn Ser Lys Leu Leu Lys Glu Tyr Lys Ser Gln Leu Ile Glu Leu Asn		
20	25	30

Ile Glu Gln Phe Glu Ala Gly Ile Gly Leu Ile Leu Gly Asp Ala Tyr  
                  35                        40                         45

Ile Arg Ser Arg Asp Glu Gly Lys Thr Tyr Cys Met Gln Phe Glu Trp  
                  50                        55                         60

Lys Asn Lys Ala Tyr Met Asp His Val Cys Leu Leu Tyr Asp Gln Trp  
                  65                        70                        75                         80

Val Leu Ser Pro Pro His Lys Lys Glu Arg Val Asn His Leu Gly Asn  
                  85                                90                         95

Leu Val Ile Thr Trp Gly Ala Gln Thr Phe Lys His Gln Ala Phe Asn  
                  100                             105                         110

Lys Leu Ala Asn Leu Phe Ile Val Asn Asn Lys Lys Thr Ile Pro Asn  
                  115                             120                         125

Asn Leu Val Glu Asn Tyr Leu Thr Pro Met Ser Leu Ala Tyr Trp Phe  
                  130                             135                         140

Met Asp Asp Gly Gly Lys Trp Asp Tyr Asn Lys Asn Ser Thr Asn Lys  
                  145                             150                         155                         160

Ser Ile Val Leu Asn Thr Gln Ser Phe Thr Phe Glu Glu Val Glu Tyr  
                  165                             170                         175

Leu Val Lys Gly Leu Arg Asn Lys Phe Gln Leu Asn Cys Tyr Val Lys  
                  180                             185                         190

Ile Asn Lys Asn Lys Pro Ile Ile Tyr Ile Asp Ser Met Ser Tyr Leu  
                  195                             200                         205

Ile Phe Tyr Asn Leu Ile Lys Pro Tyr Leu Ile Pro Gln Met Met Tyr  
                  210                             215                         220

Lys Leu Pro Asn Thr Ile Ser Ser Glu Thr Phe Leu Lys  
                  225                             230                         235

(2) INFORMATION FOR SEQ ID NO:3:

- (i) SEQUENCE CHARACTERISTICS:
  - (A) LENGTH: 722 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:3:

AAAAATAAAA TCATATGAAA AATATTAAAA AAAATCAAGT AATCAATCTC GGTCTTATT	60
CTAAATTATT AAAAGAATAT AAATCACAAT TAATTGAATT AAATATTGAA CAATTTGAAG	120
CAGGTATTGG TTTAATTGTTA GGAGATGCTT ATATTCGTAG TCGTGATGAA GGTAAAAC	180

ATTGTATGCA ATTTGAGTGG AAAAATAAGG CATACATGGA TCATGTATGT TTATTATATG	240
ATCAATGGGT ATTATCACCT CCTCATAAAA AAGAAAGAGT TAATCATTG GGTAAATTAG	300
TAATTACCTG GGGAGCTCAA ACTTTAAC ACAGCTTT TAATAAATTA GCTAACTTAT	360
TTATTGTAAA TAATAAAAAA CTTATTCCTA ATAATTAGT TGAAAATTAT TTAACACCTA	420
TGAGTCTGGC ATATTGGTTT ATGGATGATG GAGGTAAATG GGATTATAAT AAAAATTCTC	480
TTAATAAAAG TATTGTATTA AATACACAAA GTTTACTTT TGAAGAAGTA GAATATTAC	540
TTAAAGGTTT AAGAAATAAA TTTCAATTAA ATTGTTATGT TAAAATTAAT AAAAATAAAC	600
CAATTATTAA TATTGATTCT ATGAGTTATC TGATTTTTA TAATTAAATT AACCTTATT	660
TAATTCCCTCA AATGATGTAT AAACCTGCCTA ATACTATTTC ATCCGAAACT TTTTTAAAAT	720
	722

AA

(2) INFORMATION FOR SEQ ID NO:4:

- (i) SEQUENCE CHARACTERISTICS:

  - (A) LENGTH: 235 amino acids
  - (B) TYPE: amino acid
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:4:

Met Lys Asn Ile Lys Lys Asn Gln Val Met Asn Leu Gly Pro Asn Ser	15		
1	5	10	
Lys Leu Leu Lys Glu Tyr Lys Ser Gln Leu Ile Glu Leu Asn Ile Glu			
20	25	30	
Gln Phe Glu Ala Gly Ile Gly Leu Ile Leu Gly Asp Ala Tyr Ile Arg			
35	40	45	
Ser Arg Asp Glu Gly Lys Thr Tyr Cys Met Gln Phe Glu Trp Lys Asn			
50	55	60	
Lys Ala Tyr Met Asp His Val Cys Leu Leu Tyr Asp Gln Trp Val Leu			
65	70	75	80
Ser Pro Pro His Lys Lys Glu Arg Val Asn His Leu Gly Asn Leu Val			
85	90	95	
Ile Thr Trp Gly Ala Gln Thr Phe Lys His Gln Ala Phe Asn Lys Leu			
100	105	110	
Ala Asn Leu Phe Ile Val Asn Asn Lys Lys Leu Ile Pro Asn Asn Leu			
115	120	125	
Val Glu Asn Tyr Leu Thr Pro Met Ser Leu Ala Tyr Trp Phe Met Asp			

130	135	140
Asp Gly Gly Lys Trp Asp Tyr Asn Lys Asn Ser Leu Asn Lys Ser Ile		
145	150	155
Val Leu Asn Thr Gln Ser Phe Thr Phe Glu Glu Val Cys Tyr Leu Val		
165	170	175
Lys Gly Leu Arg Asn Lys Phe Gln Leu Asn Cys Tyr Val Lys Ile Asn		
180	185	190
Lys Asn Lys Pro Ile Ile Tyr Ile Asp Ser Met Ser Tyr Leu Ile Phe		
195	200	205
Tyr Asn Ile Ile Lys Pro Tyr Leu Ile Pro Gln Met Met Tyr Lys Leu		
210	215	220
Pro Asn Thr Ile Ser Ser Glu Thr Phe Leu Lys		
225	230	235

(2) INFORMATION FOR SEQ ID NO:5:

- (i) SEQUENCE CHARACTERISTICS:
  - (A) LENGTH: 754 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:5:

CCGGATCCAT GCATATGAAA AACATCAAAA AAAACCAGGT AATGAACCTG GGTCCGAACT	60
CTAAACTGCT GAAAGAACATAC AAATCCCAGC TGATCGAACT GAACATCGAA CAGTCGAAG	120
CAGGTATCGG TCTGATCCTG GGTGATGCTT ACATCCGTT TCCTGATGAA GGTAAACCT	180
ACTGTATGCA GTTCGAGTGG AAAAACAAAG CATACTGGA CCACGTATGT CTGCTGTACG	240
ATCAGTGGGT ACTGTCCCCG CCGCACAAAA AACAAACGTGT TAACCACCTG GGTAACCTGG	300
TAATCACCTG GGGCGCCAG ACTTTCAAAC ACCAAGCTTT CAACAAACTG GCTAACCTGT	360
TCATCGTTAA CAACAAAAAA ACCATCCGA ACAACCTGGT TGAAAACTAC CTGACCCCGA	420
TGTCTCTGGC ATACTGGTTC ATGGATGATG GTGGTAAATG GGATTACAAC AAAAACTCTA	480
CCAACAAATC GATCGTACTG AACACCCAGT CTTTCACCTT CGAAGAAGTA GAATACCTGG	540
TTAAGGGTCT GCGTAACAAA TTCCAACGTGA ACTGTTACGT AAAAATCAAC AAAAACAAAC	600
CGATCATCTA CATCGATTCT ATGTCTTACC TGATCTTCTA CAACCTGATC AAACCGTACC	660
TGATCCCGCA GATGATGTAC AAACTGCCGA ACACATCTC CTCCGAAACT TTCCTGAAAT	720

AATAAGTCGA CTGCAGGATC CGGTAAGTAA GTAA

754

(2) INFORMATION FOR SEQ ID NO:6:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 11 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:6:

AATGCTTTCC A

11

(2) INFORMATION FOR SEQ ID NO:7:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 25 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:7:

GTTACGCTAG GGATAACAGG GTAAT

25

(2) INFORMATION FOR SEQ ID NO:8:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 25 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:8:

CAATGCGATC CCTATTGTCC CATTA

25

(2) INFORMATION FOR SEQ ID NO:9:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 1738 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:9:

GCGGACAGGT ATCCGGTAAG CGGCAGGGTC GGAACAGGAG AGCGCACGAG GGAGCTTCCA	60
GGGGGAAACG CCTGGTATCT TTATAGTCCT GTGGGTTTC GCCACCTCTG ACTTGAGCGT	120
CGATTTTGT GATGCTCGTC AGGGGGCGG AGCCTATGGA AAAACGCCAG CAACCGGGCC	180
TTTTTACGGT TCCTGGCCTT TTGCTGGCCT TTTGCTCACA TGTTCTTCC TGCGTTATCC	240
CCTGATTCTG TGGATAACCG TATTACCGCC TTTGAGTGAG CTGATACCAG TCGCCGCAGC	300
CGAACGACCG AGCGCAGCGA GTCAGTGAGC GAGGAAGCGG AAGAGGCCA AATACGAAA	360
CCGCCTCTCC CCGCGCGTTG GCCGATTCAT TAATGCAGCT GGCACGACAG GTTCCCGAC	420
TGGAAAGCGG GCAGTGAGCG CAACGCAATT AATGTGAGTT AGCTCACTCA TTAGGCACCC	480
CAGGCTTTAC ACTTTATGCT TCCGGCTCGT ATGTTGTGTG GAATTGTGAG CGGATAACAA	540
TTTCACACAG GAAACAGCTA TGACCATGAT TACGAATTCT CATGTTGAC AGCTTATCAT	600
CGATAAGCTT TAATGCGGT A GTTATCACA GTTAAATTGC TAACGCAGTC AGGCACCGTG	660
TATGAAATCT AACAAATGCGC TCATCGTCAT CCTCGGCACC GTCACCCCTGG ATGCTGTAGG	720
CATAGGCTTG GTTATGCCGG TACTGCCGGG CCTCTTGCAG GATATCCGCC TGATGCGTGA	780
ACGTGACCGA CGTAACCACC GCGACATGTG TGTGCTGTT CGCTGGCAT GCCAGGACAA	840
CTTCTGGTCC GGTAACGTGC TGAGCCCCGC CAAGCTTACT CCCCATCCCC CTGTTGACAA	900
TTAACATCG GCTCGTATAA TGTGTGGAAT TGTGAGCGGA TAACAATTTC ACACAGGAAA	960
CAGGATCCAT GCATATGAAA AACATAAAA AAAACCAGGT AATGAACCTG GGTCCGAACT	1020
CTAAACTGCT GAAAGAATAC AAATCCCAGC TGATCGAACT GAACATCGAA CAGTCGAAG	1080
CAGGTATCGG TCTGATCCTG GGTGATGCTT ACATCCGTT TCAGTGTGAA GGTAAAACCT	1140
ACTGTATGCA GTTCGAGTGG AAAAACAAAG CATACTGGA CCACGTATGT CTGCTGTACG	1200
ATCAGTGGGT ACTGTCCCCG CCGCACAAAA AAGAACGTGT TAACCACCTG GGTAACCTGG	1260
TAATCACCTG GGGCGCCAG ACTTTCAAAC ACCAAGCTTT CAACAAACTG GCTAACCTGT	1320
TCATCGTTAA CAACAAAAAA ACCATCCGA ACAACCTGGT TGAAAATAC CTGACCCGA	1380
TGTCTCTGGC ATACTGGTTC ATGGATGATG GTGGTAAATG GGATTACAAC AAAAATCTA	1440
CCAACAAATC GATCGTACTG AACACCCAGT CTTTCACCTT CGAAGAAGTA GAATACCTGG	1500
TTAAGGGTCT GCGTAACAAA TTCCAATGAA ACTGTTACGT AAAAATCAAC AAAAACAAAC	1560

CGATCATCTA CATCGATTCT ATGTCTTACC TGATCTTCTA CAACCTGATC AAACCGTACC	1620
TCATCCCCCA GATGATGTAC AAACTGCCGA ACACTATCTC CTCCGAAACT TTCCTGAAAT	1680
AATAAGTCGA CCTGCAGCCC AAGCTTGGCA CTGGCCGTCG TTTTACAACG TCGTGACT	1738

(2) INFORMATION FOR SEQ ID NO:10:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 37 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:10:

Met Leu Val Arg Gly Ala Glu Pro Met Glu Lys Arg Gln Gln Arg Gly			
1	5	10	15
Leu Phe Thr Val Pro Gly Leu Leu Leu Ala Phe Cys Ser His Val Leu			
20	25	30	
Ser Cys Val Ile Pro			
35			

(2) INFORMATION FOR SEQ ID NO:11:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 14 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:11:

Met Gln Leu Ala Arg Gln Val Ser Arg Leu Glu Ser Gly Gln			
1	5	10	

(2) INFORMATION FOR SEQ ID NO:12:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 13 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:12:

Met Leu Pro Ala Arg Met Leu Cys Gly Ile Val Ser Gly

1

5

10

(2) INFORMATION FOR SEQ ID NO:13:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 9 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

- (ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:13:

Met Thr Met Ile Thr Asn Ser His Val  
1 5

(2) INFORMATION FOR SEQ ID NO:14:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 80 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

- (ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:14:

Met Lys Ser Asn Asn Ala Leu Ile Val Ile Leu Gly Thr Val Thr Leu  
1 5 10 15

Asp Ala Val Gly Ile Gly Leu Val Met Pro Val Leu Pro Gly Leu Leu  
20 25 30

Arg Asp Ile Arg Leu Met Arg Glu Arg Asp Gly Arg Asn His Arg Asp  
35 40 45

Met Cys Val Leu Phe Arg Trp Ala Cys Gln Asp Asn Phe Trp Ser Gly  
50 55 60

Asn Val Leu Ser Pro Ala Lys Leu Thr Pro His Pro Pro Val Asp Asn  
65 70 75 80

(2) INFORMATION FOR SEQ ID NO:15:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 7 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

- (ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:15:

Met Cys Gly Ile Val Ser Gly  
1 5

(2) INFORMATION FOR SEQ ID NO:16:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 237 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:16:

Met His Met Lys Asn Ile Lys Lys Asn Gln Val Met Asn Leu Gly Pro  
1 5 10 15  
Asn Ser Lys Leu Leu Lys Glu Tyr Lys Ser Gln Leu Ile Glu Leu Asn  
20 25 30  
Ile Glu Gln Phe Glu Ala Gly Ile Gly Leu Ile Leu Gly Asp Ala Tyr  
35 40 45  
Ile Arg Ser Arg Asp Glu Gly Lys Thr Tyr Cys Met Gln Phe Glu Trp  
50 55 60  
Lys Asn Lys Ala Tyr Met Asp His Val Cys Leu Leu Tyr Asp Gln Trp  
65 70 75 80  
Val Leu Ser Pro Pro His Lys Lys Glu Arg Val Asn His Leu Gly Asn  
85 90 95  
Leu Val Ile Thr Trp Gly Ala Gln Thr Phe Lys His Gln Ala Phe Asn  
100 105 110  
Lys Leu Ala Asn Leu Phe Ile Val Asn Asn Lys Thr Ile Pro Asn  
115 120 125  
Asn Leu Val Glu Asn Tyr Leu Thr Pro Met Ser Leu Ala Tyr Trp Phe  
130 135 140  
Met Asp Asp Gly Gly Lys Trp Asp Tyr Asn Lys Asn Ser Thr Asn Lys  
145 150 155 160  
Ser Ile Val Leu Asn Thr Gln Ser Phe Thr Phe Glu Val Glu Tyr  
165 170 175  
Leu Val Lys Gly Leu Arg Asn Lys Phe Gln Leu Asn Cys Tyr Val Lys  
180 185 190  
Ile Asn Lys Asn Lys Pro Ile Ile Tyr Ile Asp Ser Met Ser Tyr Leu  
195 200 205  
Ile Phe Tyr Asn Leu Ile Lys Pro Tyr Leu Ile Pro Gln Met Met Tyr

210

215

220

Lys Leu Pro Asn Thr Ile Ser Ser Glu Thr Phe Leu Lys  
225 230 235

(2) INFORMATION FOR SEQ ID NO:17:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 26 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:17:

CGCTAGGGAT AACAGGGTAA TATAGC

26

(2) INFORMATION FOR SEQ ID NO:18:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 26 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:18:

GCGATCCCTA TTGTCCCCATT ATATCG

26

(2) INFORMATION FOR SEQ ID NO:19:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 26 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:19:

TTCTCATGAT TAGCTCTAAC CCATGG

26

(2) INFORMATION FOR SEQ ID NO:20:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 26 base pairs  
(B) TYPE: nucleic acid

- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:20:

AAGAGTACTA ATCGAGATTA GGTACC

26

(2) INFORMATION FOR SEQ ID NO:21:

- (i) SEQUENCE CHARACTERISTICS:
  - (A) LENGTH: 26 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:21:

CTTTGGTCAT CCAGAAAGTAT ATATTT

26

(2) INFORMATION FOR SEQ ID NO:22:

- (i) SEQUENCE CHARACTERISTICS:
  - (A) LENGTH: 26 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:22:

GAAACCAGTA GGTCTTCATA TATAAA

26

(2) INFORMATION FOR SEQ ID NO:23:

- (i) SEQUENCE CHARACTERISTICS:
  - (A) LENGTH: 26 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:23:

TAACGGTCCT AAGGTAGCGA ATTCA

26

(2) INFORMATION FOR SEQ ID NO:24:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 26 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:24:

ATTGCCAGGA TTCCATCGCT TTAAGT

26

(2) INFORMATION FOR SEQ ID NO:25:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 26 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:25:

TGACTCTCTT AAGGTAGCCA AATGCC

26

(2) INFORMATION FOR SEQ ID NO:26:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 26 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:26:

ACTGAGAGAA TTCCATCGGT TTACGG

26

(2) INFORMATION FOR SEQ ID NO:27:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 26 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:27:

CGAGGTTTTG GTAATATT ATTACC

26

(2) INFORMATION FOR SEQ ID NO:28:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 26 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:28:

CCTCCAAAAC CATTGATAAA TAATGG

26

(2) INFORMATION FOR SEQ ID NO:29:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 26 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:29:

GGGTTCAAAA CGTCGTGAGA CAGTTT

26

(2) INFORMATION FOR SEQ ID NO:30:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 26 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:30:

CCCAAGTTT GCAGCACTCT GTCAAA

26

(2) INFORMATION FOR SEQ ID NO:31:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 26 base pairs  
(B) TYPE: nucleic acid

- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:31:

GATGCTGTAG GCATAGGCTT GGTTAT

26

(2) INFORMATION FOR SEQ ID NO:32:

- (i) SEQUENCE CHARACTERISTICS:
  - (A) LENGTH: 26 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:32:

CTACGACATC CGTATCCGAA CCAATA

26

(2) INFORMATION FOR SEQ ID NO:33:

- (i) SEQUENCE CHARACTERISTICS:
  - (A) LENGTH: 26 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:33:

CTTTCCGCAA CAGTATAATT TTATAAA

26

(2) INFORMATION FOR SEQ ID NO:34:

- (i) SEQUENCE CHARACTERISTICS:
  - (A) LENGTH: 26 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:34:

GAAAGGCGTT GTCATATTAA AATATT

26

(2) INFORMATION FOR SEQ ID NO:35:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 26 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:35:

ACCATGGGGT CAAATGTCTT TCTGGG

26

(2) INFORMATION FOR SEQ ID NO:36:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 26 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:36:

TGGTACCCCA GTTTACAGAA AGACCC

26

(2) INFORMATION FOR SEQ ID NO:37:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 26 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:37:

GTGCCTGAAT GATATTATT ACCTTT

26

(2) INFORMATION FOR SEQ ID NO:38:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 26 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:38:

26

GTGCCTGAAT GATATTATT ACCTTT

(2) INFORMATION FOR SEQ ID NO:39:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 39 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:39:

39

CAACGCTCAG TAGATGTTTT CTTGGGTCTA CCGTTTAAT

(2) INFORMATION FOR SEQ ID NO:40:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 39 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:40:

39

GTTGCGAGTC ATCTACAAAAA GAACCCAGAT GGCAAATTA

(2) INFORMATION FOR SEQ ID NO:41:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 32 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:41:

32

CAAGCTTATG AGTATGAAGT GAACACGTTA TT

(2) INFORMATION FOR SEQ ID NO:42:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 32 base pairs
- (B) TYPE: nucleic acid

- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:42:

GTTCGAATAC TCATACTTCA CTTGTGCAAT AA

32

(2) INFORMATION FOR SEQ ID NO:43:

- (i) SEQUENCE CHARACTERISTICS:
  - (A) LENGTH: 38 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:43:

GCTATTCGTT TTTATGTATC TTTTGCGTGT AGCTTTAA

38

(2) INFORMATION FOR SEQ ID NO:44:

- (i) SEQUENCE CHARACTERISTICS:
  - (A) LENGTH: 38 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:44:

CGATAAGCAA AAATACATAG AAAACGCACA TGGAAATT

38

(2) INFORMATION FOR SEQ ID NO:45:

- (i) SEQUENCE CHARACTERISTICS:
  - (A) LENGTH: 80 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:45:

CCAAGCTCGA ATT CGCATGC TCTAGAGCTC GGTACCCGGG ATCCTGCAGT CGACGCTAGG

60

GATAACAGGG TAATACAGAT

(2) INFORMATION FOR SEQ ID NO:46:

- (i) SEQUENCE CHARACTERISTICS:
  - (A) LENGTH: 80 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

- (ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:46:

GGTTCGAGCT TAAGCGTACG AGATCTCGAG CCATGGGCC TAGGACGTCA GCTGCGATCC	60
CTATTGTCCC ATTATGTCTA	80

(2) INFORMATION FOR SEQ ID NO:47:

- (i) SEQUENCE CHARACTERISTICS:
  - (A) LENGTH: 80 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

- (ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:47:

ATCAGATCTA AGCTTGCATG CCTGCAGGTC GACTCTAGAG GATCCCCGGG TACCGAGCTC	60
GAATTCACTG GCCGTCGTTT	80

(2) INFORMATION FOR SEQ ID NO:48:

- (i) SEQUENCE CHARACTERISTICS:
  - (A) LENGTH: 80 base pairs
  - (B) TYPE: nucleic acid
  - (C) STRANDEDNESS: single
  - (D) TOPOLOGY: linear

- (ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:48:

TAGTCTAGAT TCGAACGTAC GGACGTCCAG CTGAGATCTC CTAGGGGCC ATGGCTCGAG	60
CTTAAGTGAC CGGCAGCAA	80

(2) INFORMATION FOR SEQ ID NO:49:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 80 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:49:

TACAACGTCG TGACTGGAA AACCTGGCG TTACCCAAT TAATGCCTT GCAGCACATC	60
CCCCTTCGC CAGCTGGCGT	80

(2) INFORMATION FOR SEQ ID NO:50:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 80 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:50:

ATGTTGCAGC ACTGACCCTT TTGGGACCGC AATGGGTTGA ATTAGCGGAA CGTCGTGTAG	60
GGGGAAAGCG GTCGACCGCA	80

(2) INFORMATION FOR SEQ ID NO:51:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 18 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:51:

TAGGGATAAC AGGGTAAT	18
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(2) INFORMATION FOR SEQ ID NO:52:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 18 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:52:

ATCCCTATTG TCCCCATTA

18